Chapters 7
Structured Programming

Embedded Systems with ARM Cortex-M

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Three basic control structures

Sequence Structure

Selection Structure

Loop Structure

"Nothing is particularly hard if you divide it into small jobs."
Henry Ford, Founder of Ford Motor
Example: Factorial of a non-negative number

• $N! = 1 \times 2 \times 3 \times \ldots \times (n-2) \times (n-1) \times n$
• Draw the flowchart!
Example: Factorial of a non-negative number

- $N! = 1 \times 2 \times 3 \ldots (n-2)(n-1)(n)$
- Draw the flowchart!
Find The Maximum Value and Its Location In the Given Array

- Assume:
  - Linear search
  - Given an array[ ] – contains signed numbers
  - R3 = Array_Size
  - R0 = Max_Value
  - R2 = Counter
  - R1 = Array_Index
  - Each number in the array is a word size

- Array: DCD 1,2,3,-1, ...
- Size: DCD 4
Find The Maximum Value and Its Location In the Given Array

Array size
Array R0 = Default max
Array R1 = max location
Update the index
R5 = R4 + R2 * 4
Update COUNT (Size)
Find out the Parity bit value and the number of 1’s in a given value n

- ODD Parity: 1 if event number of ones
- EVEN Parity: 1 if odd number of ones
- The basic Algorithms:
  
  While (n > 0)
  {
    Find n-1
    Calculate n = n & n-1
    Flip parity bit
    Count ++
  }
Convert String to an Integer

• ASCII values for numbers 0-9 are 0x30-0x39. Thus, we need to subtract 0x30 from a given ASCII to convert it into a number

• Assume out STR is given as 123456